

Name:

Date:

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PART A In the space on the left, write the letter of the term or phrase which **best** completes the statement or answers the question (1 mark each).

- _____ 1. This radiation releases charged atomic particles with the same combination of particles as the nucleus of a helium atom.
- a. Alpha
 - b. Beta
 - c. Gamma
 - d. UV
- _____ 2. If an initial sample of 10.00g has a half life of eight days, how much of it remains after 24 days?
- a. 5.00g
 - b. 7.50g
 - c. 2.50g
 - d. 1.25g
- _____ 3. Radiocarbon dating utilizes which of the following carbon isotopes?
- a. Carbon-12 and carbon-13
 - b. Carbon-13 and carbon-14
 - c. Carbon-12 and carbon-14
 - d. Carbon-11 and carbon-14
- _____ 4. Isotopes are different atoms of a particular element that have the same number of protons ...
- a. but the same atomic number.
 - b. but different mass numbers.
 - c. and the same charge.
 - d. and fewer electrons and neutrons.
- _____ 5. Beta decay involves the release of ...
- a. a helium atom.
 - b. a proton.
 - c. a neutron.
 - d. an electron.
- _____ 6. Which is the most penetrating type of radioactive decay?
- a. Alpha radiation
 - b. Ultraviolet radiation
 - c. Beta radiation
 - d. Gamma radiation

- ___ 7. A _____ involves splitting a more massive nucleus into two less massive nuclei, subatomic particles, and energy.
- nuclear fission reaction
 - decay curve
 - daughter isotope
 - nuclear fusion reaction
- ___ 8. _____ is the source of energy of our Sun.
- Fission
 - UV radiation
 - Fusion
 - Beta decay
- ___ 9. The dangerous chain reactions that occur in nuclear reactions can be controlled using ...
- Steam generators
 - Circulating water
 - Cadmium rods
 - Uranium walls
- ___ 10. _____ involves joining two low mass nuclei to make a more massive nucleus and energy.
- A nuclear fission reaction
 - beta decay
 - alpha decay
 - A nuclear fusion reaction

PART B In the space provided mark each of the following as true or false. (1 mark each)

- ___ 1. An electron is a product of beta decay.
- ___ 2. CANDU stands for Canadian Decaying Uranium, and is a nuclear reactor.
- ___ 3. Gamma rays have much more energy than UV rays or x-rays.
- ___ 4. Radiocarbon dating can only be used on once-living things less than 100 years old.
- ___ 5. Parent isotopes are stable, while daughter isotopes are unstable.
- ___ 6. The stable isotope of a uranium-238 decay series is lead-206.
- ___ 7. Alpha particles can be used to induce nuclear reactions.
- ___ 8. The nuclear fission reaction of uranium-235 is initiated by neutron bombardment.
- ___ 9. Alpha radiation is more highly penetrating than gamma radiation.
- ___ 10. Isotopes have the same number of neutrons, but different numbers of protons.

PART C In the space provided, match each term or phrase with the best definition. (1 mark each)

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|---------------------------|---|
| ___ 1. Alpha decay | A. Different atoms of an element with different mass numbers. |
| ___ 2. Isotope | B. The isotope that undergoes radioactive decay. |
| ___ 3. Gamma decay | C. Involves the release of electrons. |
| ___ 4. Daughter isotope | D. Involves the release of a helium atom. |
| ___ 5. Nuclear fission | E. The joining of two smaller nuclei to form a more massive nucleus. |
| ___ 6. Radiocarbon dating | F. Always ends in the formation of a stable isotope. |
| ___ 7. Beta decay | G. The splitting of a massive nucleus into two smaller nuclei. |
| ___ 8. Nuclear fusion | H. The stable product of radioactive decay. |
| ___ 9. Decay series | I. Can be used to determine the age of now dead, but once living, things. |
| ___ 10. Parent isotope | J. Consists of rays of high-energy, short-wavelength radiation. |

PART D Each of the following questions requires a short answer.

1. Explain the process of radiocarbon dating and how it can be used to determine the age of a dead organism. Be sure to include which carbon isotope decays once the organism dies and what product the carbon isotope turns in to. (3 marks)

2. Explain how uranium-235 nuclear fission reactions are induced. Also explain what chain reactions are and how the nuclear fission of uranium-235 often leads to a chain reaction. (4 marks)

3. List one similarity and two differences between fission and fusion reactions. (3 marks)

PART E Complete the following radiation reactions and classify each reaction as producing alpha, beta, or gamma radiation. (2 marks each)

